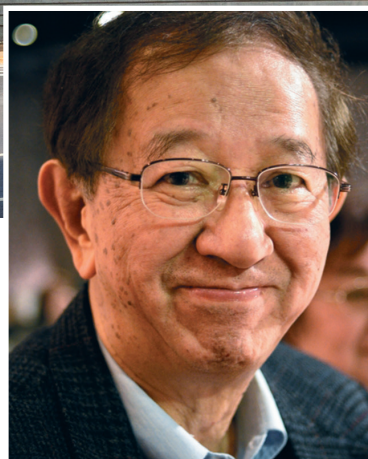


Meeting global challenges to secure our global village



by Ehud Keinan

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Interview with Prof. Yuan Tseh Lee, Academia Sinica

It was a sunny day in the early afternoon of September 22, 2014. I visited Prof. Lee at his office in the modern, high-rise building of the Genomic Research Center. Through the large windows of the spacious office, sitting over high-quality Oolong tea, I could enjoy the magnificent view of the Academia Sinica campus.



Ehud Keinan

Professor Keinan of the Technion is President of the Israel Chemical Society, Editor-in-Chief of *AsiaChem* and the *Israel Journal of Chemistry*, Council Member of the Wolf Foundation, IUPAC Bureau Member, and past Board Member of EuChemS. He was Dean of Chemistry at the Technion, Head of the Institute of Catalysis, and Adjunct Professor at The Scripps Research Institute in California. His research program includes biocatalysis, organic synthesis, molecular computing, supramolecular chemistry, and drug discovery. He received the New England Award, the Herschel-Rich Award, the Henri Taub Prize, the Schulich Prize, the Asia-Pacific Triple E Award, AAAS Fellowship, and the EuChemS Award of Service.



PROFESSOR LEE, THE world knows much about your scientific achievements, particularly after winning the 1986 Nobel Prize in Chemistry with Dudley Herschbach and John Polanyi. Most chemists know about your work on the use of advanced chemical kinetics and crossed molecular beams to investigate and manipulate the behavior of chemical reactions. Since many youngsters, particularly in Asia, take you as a role model, I wish to focus on the very beginning of your life journey and talk about your childhood. If these Asian kids could understand what has attracted you to science, we may gain new generations of excellent scientists. My first question is, how early in your life has science triggered your curiosity?

I was born in Hsinchu in 1936 and started my elementary school during WWII before the American Airforce started bombing Taiwan daily. That experience contributed much to my resilience. To avoid the American bombing of Hsinchu, my mother, myself, younger brother, and sister ran away to the mountains and stayed there as refugees for two years. That period in the mountains was the happiest time of my life. I learned how to live with the farmers, working very hard to survive without electricity and running water.

I didn't go to school in those two years. I am number 3 of nine siblings, five brothers and four sisters. My older brothers and my father remained in the city because the Japanese authorities did not allow them to go to the mountains. They had to help as firefighters when

needed and do other services. Much of the time, they lived in a shelter. Life was not easy in the mountains. I was seven years old at that time, and my elder sister, who was nine, had to carry the water from the bottom of the hill up several trips every day and helped the farmers planting, fishing, etc. It was a wonderful time for me, and I remember the change of seasons with birds nesting and us catching eggs, and I was puzzled by the wonders of nature, things that young children these days don't have a chance to experience.

When and why did you consider becoming a scientist?

When I lived in the mountains during the extensive US bombing, the US Airforce didn't know that the Japanese didn't have radar systems, so they always distributed tin foil

flakes, and we, as kids, used to collect boxes of tin foil. I was asking myself when it was safe for me to go out and collect the tin foil. I learned that because of the principle of conservation of momentum, when the plane is already above you, it is safe, and the bombs cannot reach you. Also, the bombs technology attracted me to learn chemistry.

I can say that war technology stirred in me much interest, and already in Junior school, I decided to become a scientist. My science teacher was impressed by me and told me, "you are hopeful." Already in 5th grade, I was reading many things. I remember one cartoon that impressed me very much: a little sheep goes to a chemistry lab, talking to a chemist wearing a lab coat, asking, "can you change my wool into nylon?" I was impressed because it demonstrated that scientists could make artificial things better than those existing in nature. After WWII, nylon stockings became so popular among women, symbolizing the triumph of science.

When I finished 5th grade, I read a book on how the Soviet Union, under a 5-year plan, changed a very backward agricultural society into an advanced industrial society, highlighting the benefits of science and technology. When I was in 6th grade, my mother gave me a red envelope with some money on the Chinese Lunar new year, as most other Chinese kids received. My brother went to the bookstore to buy books with this money, and I went with him. There I found magazines for elementary school, published in Shanghai. I read an article

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named "blue carpet," describing Russia's social revolution, describing how a slave on the farm became a master of his land. I was so excited that people could change society if they worked hard, which gave me much hope that our society could be improved. In high school, when I read the biography of Marie Curie, written by her daughter, I realized that a scientist's life could be beautiful and exciting and full of discoveries, so I wanted to become a scientist.

became very quiet. But my mom said then the belt is too tense at one side and too loose on the other, so I took the head apart and fixed it again and adjusted it properly.

Where did you pick up the electrical and mechanical education needed for such tasks?

The mechanical information I learned just from taking things apart and observing how they work together. After the war, my cousin came back from Japan, where he attended a technical school, and he taught me not to be afraid of high voltage cord as long as I insulate my body from the ground. I could even touch the high voltage cord if sitting on a couch.

As an amateur technician, did you seek any help from others?

No, I did it all by myself. My father, who was an artist, a very handy man, influenced me much. You can see some of his framed paintings decorating the walls of my office. He started his career as an art teacher in elementary school, climbed up rapidly to Junior high, then to high school, and finally became a university lecturer. He died at age 73, one year after I received the Nobel Prize, and I was so happy that he managed to witness the ceremony in Stockholm. He was overwhelmed by so many people coming to greet him. That time I was still in California. When I came back to Taiwan, my mother was still here. She died at age 87.

Did you receive a good formal education to become a scientist?

In general, the answer is yes; my formal education was right. My school gave me enough space and time to grow without putting too much pressure on me. The worst type of education is a school that takes up

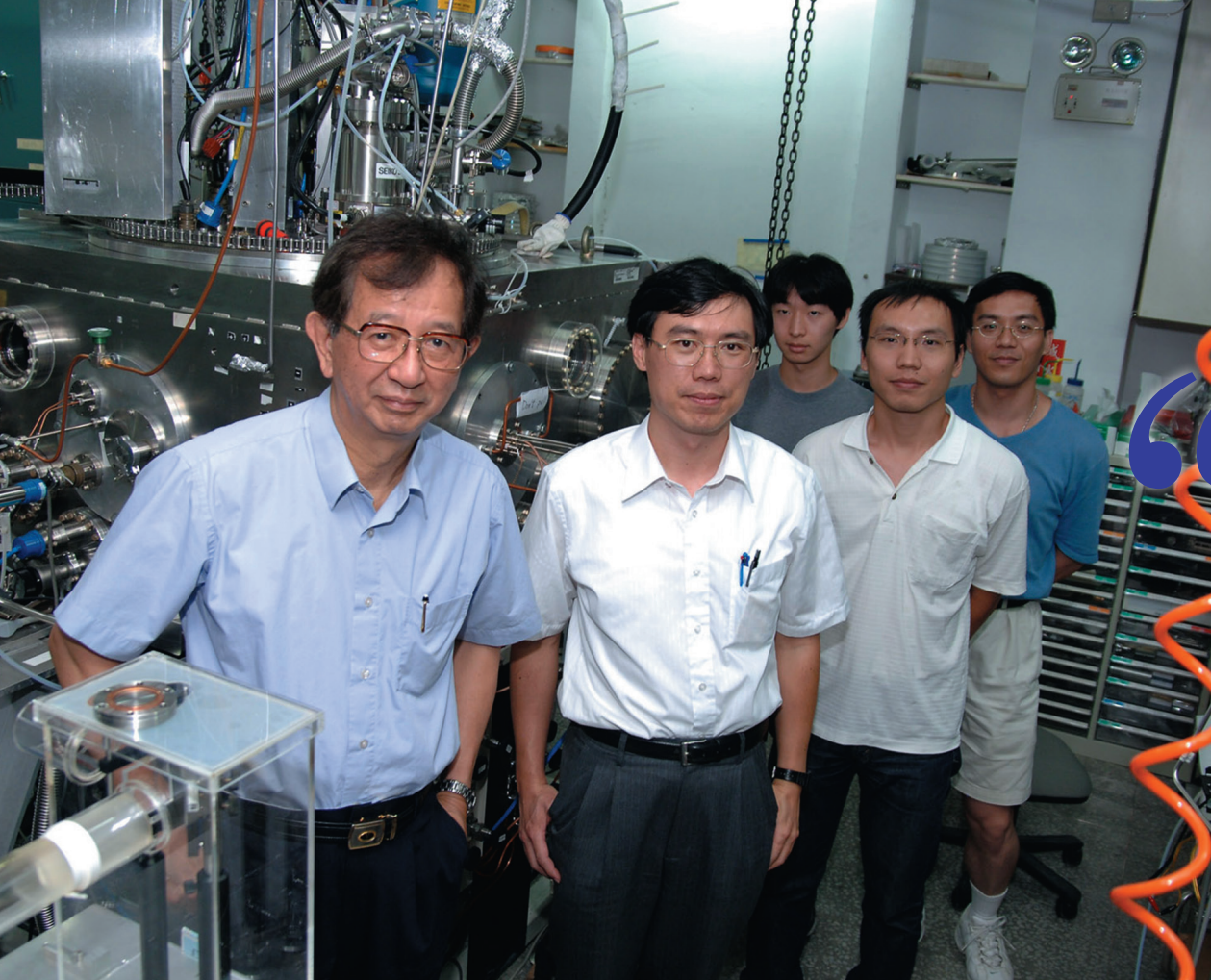
Your childhood experience gives me the impression that you grew up as a lonely boy with books and thoughts. What about family and friends?

Oh, I had many friends, brothers and sisters, and cousins, all living in the same block. I must say that my mother had a significant influence on my development as a scientist. In those days, only highly talented people could compete in the exams for high school, and my mother did. After graduating from high school, she stayed one more year to become an elementary school teacher. I remember that she always challenged me with many philosophical questions, and often with mechanical problems. For example, when the iron broke, she asked me if I could fix it. I took it apart very carefully, learned how electricity worked, and where did the shortage occur. I learned which line was the high voltage and where to connect the cables, and I finally fixed it. I think I was that time in 9th grade in junior high school.

I remember another case with a Singer sewing machine with a foot pedal that was very noisy, and my mother used to work on it at night. I complained about the noise, and my mother responded: why are you complaining? Fix it and make it quieter. I took the machine apart, oiled it, replaced and tightened some bolts and nuts until it

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all your time and does not leave you space to develop. By the time I became a 10th-grade pupil at junior high school, I was already very independent. After 10th grade, I studied almost everything by myself. I read many books on science and social science and learned enough math and physics to match the 12th-grade level.

At that time, I had too many activities and exhausted myself to such a degree that I had to stay home for one month to recover. I was a tennis player, table-tennis player, baseball player, and I played trombone in a brass band. I was active in the boy scouts and went to camps until I fell sick of exhaustion. The doctor forced me to stay at home for one month, which allowed me to think of the meaning of life. I was a quite rebellious youngster, didn't want to be controlled by either school or society, always wanted to be the master of myself. I often annoyed my teachers by asking for lots of difficult questions.

After that month of thinking and reflection, I remember that I went back to school as a different person. I learned how to use time productively, a skill that was very beneficial to my entire career. When I went to university, I had two goals in mind. My primary dream was to become a scientist to contribute to society. Not less important, I wanted to work with idealistic people to advance society in general. I have realized that any person with exceptional skills in any given field can benefit society and push it forward.

Brain drain has been a notoriously known problem in Taiwan. Are you trying to remedy this problem?

It has not only been a Taiwanese issue but an Asian problem. In the 1960s and 70s, we suffered a significant brain drain. Many young people, including myself, went to America and stayed there. But now, during the last two decades, many established scientists, including members of the National Academy of Sciences, have returned to Taiwan. I prefer not to use the term brain drain because scientists need to go to other countries to complement their education. A more appropriate term would be brain circulation. Young people go out to learn something and get new experience and then come back.

As Taiwan's situation keeps improving, more and more students like to stay at home rather than abroad. We still support them with scholarships and send them out to foreign countries because they need to see the world before developing their independent career. We can see many Asian scholars returning to their native countries and make a real difference by boosting their development. It is no longer a one-way brain drain, but rather brain circulation.

Did you ever fulfill your desire to make the world a better place?

I think I was lucky to be able to do some good things, at least for my own country.

In 1994 I received an invitation to become President of Academia Sinica. I thought that at age 57, it might be a good time to return to my home country to contribute to the place I grew up in, and I wanted to do it before I became an old man. After spending 32 years in the USA, I left Berkeley, gave up my US citizenship, and returned to Taiwan with my wife, whereas our three grownup children preferred to stay in the USA.

Academia Sinica is Taiwan's top research body. It has over 30 research institutes, covering the humanities, social sciences, the physical and biological sciences. During my tenure as President of Academia Sinica, from 1994 to 2006, I worked hard to improve research quality to make it a world-class institution.

Winning the Nobel Prize allowed me to serve various segments of society. As President of Academia Sinica, I could play a significant role in shaping educational and scientific policy in Taiwan. Since I reported directly to the President of Taiwan and acted as his senior science adviser, I could talk to him anytime I wanted. As the Chair of Taiwan's Council of Educational Reform, I tried to advocate democratization, professionalism, and university autonomy. I have also led a national organization for community empowerment in Taiwan. I chaired a nonpartisan group that advised the President on matters concerning the relations between Taiwan and

China. I have established several new organizations that support education and research activities, etc. In general, I have done everything I could to revamp the Taiwanese education system and to enhance creativity and innovation.

Did you manage to influence other parts of the world as well?

My goal of working with idealistic people to make the world a better place stayed unchanged over the years. I have always been interested in higher education's direction and responsibilities, the development of creative scientists in Asia, the future of humankind, the futility of war, and environmental challenges, such as global warming. We all live in a global village, and we need to join forces to meet global challenges. To advance these ideas, I served on the International Council for Science (ICS), first as President-elect and (2008-2011) and then as President (2011-2014). I also served as President of the Tan Kah Kee International Society, a significant foundation based in Singapore, dedicated to promoting education as a means of advancing democracy and development. In many of my public lectures, I try to raise public awareness of environmental issues. I think that the greatest danger to humanity is climate change, which is even more alarming than a nuclear war. For the first time, human civilization can change the environment to the point where it can no longer support life. Since we are facing a global problem, neither a single country nor scientists can solve it alone. Suppose we learn to connect knowledge to action, establish better international institutions, and coordinate all global efforts. In that case, we may save the world from global warming before the middle of this century.

I am happy to realize that both of us share optimistic views concerning the future of science and development in Asia. Thank you very much for sharing your experience and opinions with the readers of AsiaChem.

EPILOGUE: THIS INTERVIEW took place in September 2014. Now, six years later, I reminded Prof. Lee of that interview. After looking at it, he responded, "Although almost six years passed, the content is still fresh in my mind. I would not answer any of your questions differently. I will be delighted to see this article published in AsiaChem and would like to express my admiration for taking up such a major responsibility. I do believe that your efforts will strongly impact students in Asia." ◆



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